Sub A1

~~What is claimed is:~~

1. A method for shifting the instant of commutation for a sensorless and brushless direct-current motor (1), whose stator windings are fed by a multi-phase converter connection,
wherein commutation is detected by comparing the voltage induced in a stator winding phase in which no current is applied, to a reference voltage (U_{ref}), and the reference voltage (U_{ref}) is changed in dependence upon the setpoint value ($N_{setpoint}$) of the rotational speed of the motor (1) and/or the manipulated variable (U_{st}) calculated therefrom.

2. The method as recited in Claim 1,
wherein the instant of commutation is shifted forward with respect to time in such a manner that an optimum current waveform is achieved, i.e., optimum particularly with respect to increasing the power and/or reducing the torque ripple.

3. The method as recited in Claim 1 or 2,
wherein the instant of commutation is shifted in such a manner that the reference voltage (U_{ref}) is raised in the shape of a parabola.

4. The method as recited in Claim 3,
wherein given a pulse width modulation of the current supplied to the stator windings, the parabola-shaped raising of the reference voltage begins at a pulse width modulation ratio of about 90 to 95%, in particular 93%.

5. The method as recited in Claim 1 or in one of Claims 2 through 4,
wherein besides being used for changing the reference value for the instant of commutation, the manipulated variable (U_{st}) determined in dependence upon the setpoint value ($N_{setpoint}$) of the rotational speed is also used for adapting the current supply to the individual stator winding phases, raising it or lowering it accordingly.

6. A system for implementing the method as recited in Claim 1 or in one of Claims 2 through 5, having a sensorless and brushless direct-current motor (1), which is fed by

a multi-stage converter connection, which, for its part, includes an output stage control (2), a commutation logic (3), a phase selector (4), and a phase discriminator (5), wherein a commutation detection (6) is provided which is supplied at one input (46) by the phase selector (4) with the instantaneous value of the voltage induced in a non-energized phase and, at a second input (47), with a reference voltage (U_{ref}), for comparison; and the reference voltage (U_{ref}) can be changed by a commutation shift (7) in accordance with a specific curve, a manipulated variable (U_{st}) being supplied to the commutation shift (7) by a manipulated-variable calculation (8) as a function of the setpoint speed ($N_{setpoint}$) of the motor (1).

7. The system as recited in Claim 6, wherein in the commutation shift (7), the reference voltage (U_{ref}) is changed in accordance with a parabola, in particular increased.

8. The system as recited in Claim 7, wherein, given a pulse width modulation (PWM) of the current supply to the individual stator winding phases of the motor (1), the reference voltage (U_{ref}) is increased in a parabola shape, starting from a pulse width modulation ratio of about 90 to 95%, preferably 93%.

9. The system as recited in Claim 6 or in one of Claims 7 or 8, wherein the manipulated-variable calculation (8) computes a manipulated variable (U_{st}) as a non-linear function of the setpoint speed ($N_{setpoint}$) of the motor (1), this manipulated variable being fed, on the one hand (87), as an input to the commutation shift (7), and, on the other hand (83), to the commutation logic (3) to adapt the current supply to the stator winding phases of the motor (1).

ADD
A2